EPIDEMIOLOGIC METHODS: STUDIES WITH SECONDARY DATA AND PRIMER ON META ANALYSIS

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I. Data Analysis

A. Primary Data Analysis

1. Definition - the original analysis of data from a research study

B. Secondary Data Analysis

2. Definition - the reanalysis of data to answer new research questions

II. Subgroup Analysis

A. Types of Subgroup Analyses

1. Analyses intended at the start of the trial (Preferable).

2. Analyses not stated in advance, but easily justified.

3. Analyses not stated in advance that may not be justified.

a. Data dredging

4. Post hoc analyses may best be viewed as "hypothesis generating" rather than "hypothesis testing".

5. Primary vs. Secondary subgroup analyses

B. Deciding to Perform a Subgroup Analysis (Bulpitt)

1. Was the analysis planned in advance?

2. Is the analysis likely to be subject to bias? (Responders only?)

3. Is the analysis biologically plausible?

4. Is the result of the overall trial significant?

C. Is the Difference in Subgroup Response Real? (Oxman, Guyatt)

1. Is the magnitude of the difference clinically important?

2. Was the difference statistically significant?

3. Was the hypotheses proposed in advance?

4. Was the analysis one of many?

   a. Problem of multiple comparisons

5. Was the difference suggested by comparisons within studies?

6. Was the difference consistent across studies?

7. Is there indirect evidence to support the difference?

III. Meta-Analysis

A. Definition - research synthesis that uses formal statistical procedures to retrieve, select, and combine results from previous studies

B. Purposes

1. To obtain a more stable estimate of the effect of a treatment.

2. To examine variability between studies and assess the generalisability of the results.

3. To perform subgroup analyses

4. To identify the need and planning for clinical studies.

5. To decrease biases by aggregating studies with similar goals.

C. When to Perform a Meta-Analysis (Bulpitt)

1. Only randomized controlled trials should be selected.

2. The trials should address a standard question.

3. The outcome of interest should be clearly reported.

4. The patients should be comparable.

D. Methodology

1. Develop a protocol

2. Identify sources of clinical studies.

3. Define the criteria for selecting studies

4. Have independent readers classify, code and score the studies.

5. Combine results

E. Potential problems of Meta-Analysis

1. Publication bias

2. Selection bias

3. Retrospective approach

4. Incomplete data in source documents

5. Observer bias in evaluating studies for inclusion

6. Quality of data from different studies is variable

7. Differences may exist between trials

   a. Question posed

   b. Severity of outcome

c. Concomitant events

d. Doses or schedule of medications

e. Design quality

f. Quality of study conduct

g. Quality of study analysis

Epidemiologic Methods: Studies with Secondary Data and Primer on Meta Analysis

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Lecture Questions

1. Subgroup analyses

   a. must always be specified in advance.

   b. are more likely to be significant when many analyses are performed.

   c. are more likely to be of value when the overall trial result is not significant.

   d. should be biologically plausible

   e. should examine as many variables as possible to find any conceivable association with a treatment effect.

2. What is / are true of meta-analyses?

   a. They can produce order from disparate studies and frequently obtain stable estimates of the effect of a treatment.

   b. They are simple to perform

   c. They can examine the variability between studies.

   d. They are more cost effective than a single, large, well-controlled study.

   e. All of the above.

3. Some problems of meta-analyses include

   a. the inability to obtain data from unpublished studies

   b. the quality of data from different studies is variable

   c. the data are approached retrospectively

   d. there may be a selection bias in which studies to include

   e. All of the above

Annotated References

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